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(54) **Title**: ORGAN-ON-A-CHIP-DEVICE

(57) **Abstract**: The present invention relates to a self-contained sensor controlled organ on a chip-device, which allows establishing or maintaining organs or organoids as well as stem cell niches in a miniaturized chip format, suitable for online observation by live cell imaging and for example two photon microscopy and their use for, e.g. testing the activity, pharmacodynamic and pharmacokinetic of compounds or to study self-assembly, homeostasis, damage, regeneration or interaction of organs or organoids and stem cell niches, as well as phenomena of maturation, aging, death and chronobiology.